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TITLE:

(6) Deterioration of optical elements in humid, tropical climates

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(15) Pomiar, Automatyka, Kontrola, no. 12, 1962, pp. 568-571, ←

TEXT:

The present paper is a review based on 4 Western, 2 Russian and 3 Polish references, and refers to a climate in which the relative humidity is always 90 to 95-100% (at 20-35°C), and the maximum temperature does not exceed 40°C. The effects are summarized under the headings of: 1) Condensation of water vapor (misting and deposition of larger droplets and films, the latter including condensation of hydrocarbons from lubricants and plasticizers from plastic and rubber components). 2) The chemical action of water (reacting out of alkali oxides, hydrolysis of alkali silicates and deposition of hydrated silica). 3) Protection afforded by blooming

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the elements. 4) Effects of mold growth (staining, in extreme cases etching and necessitation of repolishing). Some tests on Polish optical elements are then described [Abstracter's note: Apparently authors' own]. Twenty enlarger objectives were stored (in open and closed plastic boxes) in a climatic chamber, over 21 24-hour cycles of: 40 ± 2°C over 8-12 hours at 95-5% relative humidity and 35-40°C over 12-16 hours at 95-100% relative humidity. After this test, the outer surfaces showed irregular matt areas and fine droplets and the internal surfaces were slightly misted. Anti-reflection coatings were damaged. The exact nature of this attack was not ascertained. Closed boxes afforded protection over only ~ 48 hours. After 23 days at 27°C, followed by 22 days at 29°C (at ~ 95% relative humidity throughout the test), in a Petrie dish in close proximity to a mold colony including *Alternaria tenuis*, in the dark, all 24 bloomed elements tested showed mold attack, which was already difficult to remove with gauze. Considerable moisture damage was also caused in this test to the anti-reflection coatings, glass and cement. Apart from disconnected observations, the actual effects of hot, moist climates on Polish optical instru-

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ments are largely unknown. The following protective measures are discussed: hermetic sealing, dehydration of surrounding air-space, hydrophobic coatings, periodic cleaning, sterilization with ionizing radiation, uv, and h.f. current, and chemical mold growth inhibitors. Dehydration of surrounding air-space with silica gel and the use of anti-molding cements, lacquers and volatile fungicides are recommended for use in Poland. There are 3 figures.

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